ESO 158

# EVALUATION OF THE USE OF COMPUTER ASSISTED INSTRUCTION FOR TEACHING INTRODUCTORY PRINCIPLES OF PRODUCTION ECONOMICS

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# EVALUATION OF THE USE OF COMPUTER ASSISTED INSTRUCTION FOR TEACHING INTRODUCTORY PRINCIPLES OF PRODUCTION ECONOMICS*

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The use of Computer Assisted Instruction (CAI) for supplementing the traditional classroom and textbook presentations of production principles and the related cost concepts was evaluated. The study indicates that the use of CAI is an effective supplemental instrument that enhances the learning process of students. The presentation of these course materials through the use of Computer Assisted Instruction was well received by most students.

The introductory course in Agricultural Economics at The Ohio State University introduces the student to basic economic principles. It is a required course for most of the students in the College of Agriculture and the School of Natural Resources, being taken during the student's freshman or sophomore year. The course is taught in sections of approximately 75 students, meeting five days per week with the same instructor. The approximate annual enrollment is 1000 students.

An important segment of the course deals with production principles and the related cost concepts. These concepts are difficult for many of our students to master at a satisfactory level. Many of the students need a supplement to the text and classroom discussions to adequately grasp the material in the allotted time.

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After consideration of several alternatives, Computer Assisted Instruction (CAI) was selected as the vehicle to assist these students because: 1) it provided problem situations that reinforced the learning process; 2) it provided the opportunity for the student to schedule his learning experience; 3) it permitted the student to proceed through the learning material at his own pace; 4) it provided comparable treatment of subject matter topics in a multisection course; and 5) it provided a review for students enrolled in advanced courses in the Department.

The CAI Program

The instructional material covered factor-product, factor-factor, product-product and the short run cost concepts. The economic concepts were applied to farm enterprise situations by requiring the student to make economic decisions commonly faced by most farmers. As the student answered these questions during the role playing format of the program, the computer analyzed his responses. If he was correct, the program proceeded to the next step; if he was wrong, he was tutored prior to going to the next course segment.

A teletypwriter terminal was the interface between the student and the computer. The degree of typing skill required, however, was kept to a minimum as only short answers were required. Paper printouts of the learning experience allowed the student the opportunity for further study and review.

The Agricultural Economics CAI materials have been used by more than 2000 students since it was introduced during the Spring Quarter of 1971.

Although student response to the program has been very favorable, the future use of CAI in our Department is, in part, dependent upon its effectiveness in helping students to comprehend basic economic principles. Therefore, a study was designed to evaluate student performance.

Procedure

The four sections of Agricultural Economics 100 were taught by two instructors during Winter Quarter, 1973. Instructor A taught the 9 a.m. and 11 a.m. sections, and Instructor B taught the 10 a.m. and 2 p.m. sections. Each instructor followed the same course outline and the two instructors coordinated their lecture notes in an effort to standardize the classroom format.

The treatment of the sections differed in that students enrolled in the 10 a.m. and 11 a.m. sections utilized the CAI material as a supplementary media outside of the classroom. The 9 a.m. and 2 p.m. sections were used as control groups. These students did not have access to the CAI materials. Neither the students in the control or the treatment sections were aware of the experiment to evaluate student performance.

The experimental design was as follows:

| Time of Class | Instructor | Treatment |
|---|---|---|
| 9 a.m. | A | No CAI |
| 10 a.m. | B | CAI |
| 11 a.m. | A | No CAI |
| 2 p.m. | B | CAI |

Test scores were used to measure the performance level of control (no CAI) and treatment (CAI) sections of Agricultural Economics 100. Identical test questions were used for each section.

## Findings

Higher midterm test scores were achieved in the sections of the course utilizing CAI (Table 1). The two sections not utilizing CAI had a mean test score of 60.6 (from a possible total of 84 points), while the two sections utilizing CAI had a mean test score of 64.9. This treatment difference was significant at the 1% level.

Test scores were also evaluated to determine if a statistical difference existed between instructors. The mean scores for Instructors A and B were 61.8 and 63.5, respectively. This interaction effect was insignificant and indicates that the treatment effect existed independent of instructors. Hence, the students had a similar learning experience from each of the instructors.

## Implications

The value of CAI is reduced if it is not favorably received. In a previous study, students were asked to evaluate the usefulness of CAI in teaching Agricultural Economics 100. Fifty-five of the 59 students participating in the study thought CAI had been a beneficial learning experience. The four who rated CAI "low" in terms of usefulness were high achievers and perhaps did not need a supplemental teaching program.

TABLE 1

STUDENT PERFORMANCE AND INSTRUCTOR DIFFERENCES FOR CONTROL AND TREATMENT SECTIONS OF AGRICULTURAL ECONOMICS 100, THE OHIO STATE UNIVERSITY, 1973

| Instructor | | CAI | No CAI | Instructor Total | Instructor $\bar{X}$ | |
|---|---|---|---|---|---|---|
| A | Class Size | 51 | 66 | 117 | 61.8 | |
| | Time | 11 a.m. | 9 a.m. | | | $F_{1, 261} = 1.05$ |
| B | Class Size | 83 | 65 | 148 | 63.5 | |
| | Time | 10 a.m. | 2 p.m. | | | |
| Treatment Total | | 134 | 131 | 265 | | |
| | $\bar{X}$ | 64.9 | 60.6 | | 62.8 | |

$F_{1, 261} = 6.76$

The CAI program has been used only as a supplement to regularly scheduled classes. Based upon subjective evaluation of student responses, the program is not "self contained." Additional reference materials and/or classroom presentations are required for the present program to be totally meaningful.

The CAI Agricultural Economics Program at The Ohio State University has been very successful. It has been favorably accepted by the students as a teaching aid and has been found to have a significant effect on the performance of students.